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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,534	03/26/2004	Hui Wen Chang	N1085-00242 [TSMC2003-046]	8966
54657 7590 04/12/2007 DUANE MORRIS LLP IP DEPARTMENT (TSMC) 30 SOUTH 17TH STREET PHILADELPHIA, PA 19103-4196			EXAMINER BAND, MICHAEL A	
			ART UNIT	PAPER NUMBER
			1709	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/12/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/810,534

Applicant(s)

CHANG ET AL.

Examiner

Michael Band

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☒ Claim(s) 1-12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/26/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: The symbol "Δ". Examiner is unsure whether this relates to rate of change, change in heat, or something else similar in nature.

Appropriate correction is required.

2. Claims 1-12 are objected to because of the following informalities: The symbol "Δ". Examiner is unsure whether this relates to rate of change, change in heat, or something else similar in nature. Appropriate correction is required.

3. Claims 2, 5, and 9 are objected to because of the following informalities: Discusses recording the criteria in a table for multiple targets in respective multiple ones of the tool. The disclosure states the method and system for one target. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. Claims 1-3, 7-10, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner (US Patent No. 4,166,783) in view of Actor et al (US Patent No. 5,478,455).

With respect to claim 1, Turner '783 discloses "a sputtering system utilizing a computer" (abstract). The "desired deposition rate information is input to a computer, which establishes and maintains the desired rate and controls" (abstract) for "aging and deterioration of the target" (abstract). The "end of the target life is determined by the computer from objective criteria [that] triggers appropriate actions" (abstract), such as when the reported accumulating rate is less than the minimum, an operator is alerted to examine or replace the target.

However Turner '783 is limited by not specifically stating onto what the target is sputtering (i.e. substrate, semiconductor piece, etc.)

Actor '455 teaches a sputtering magnetron using physical vapor deposition for film deposition onto "substrates or wafers" (col. 7, line 41).

It would have been obvious to one of ordinary skill in the art to use a substrate or wafer for sputter deposition taught in Actor '455 as a typical sputtered workpiece in the sputter target control method of Turner '783.

With respect to claim 2, Turner '783 further discloses that the "information is input to the computer" (i.e. recording the criteria) (abstract). Since the computer branches to a stop when the target exceeds predetermined amount, by default the information must be organized and stored by some system (i.e. table, spreadsheet, etc). The criteria is then selected and retrieved "to trigger appropriate actions" (abstract).

With respect to claim 3, Turner '783 further discloses a "stop condition" (i.e. alarm) (col. 3, lines 43-44) that is generated. The stop condition is generated if the cathode usage (i.e. reported accumulating rate) exceeds a predetermined amount (i.e. minimum accumulating rate).

With respect to claim 7, Turner '783 teaches a method of the computer stopping the sputtering process "when the usage of the cathode (i.e. target) exceeds a predetermined amount" (col. 3, lines 42-43). The elapsed KWH of usage is used to access an aging function stored in the computer (i.e. minimum accumulating rate), which "is peculiar to the type of cathode (i.e. target) employed" (col. 3, lines 46-47). Determining the elapsed usage of a specified target determines the thickness of the target.

However Turner '783 is limited in that a graph of the reported accumulating rate is not compared with a slope of the minimum accumulating rate for one kilowatt of power.

Actor '455 further teaches a computer program for measuring and comparing sputtering parameters that may be varied (col. 3, line 60). Actor states using an analytical equation to compare deposition rate (i.e. reported accumulating rate) and slope of the curve of deposition rate versus target age (i.e. minimum accumulating rate) (col. 3, lines 57-59). Actor '455 also states that other sputter parameters may be included into this analytical equation for comparison purposes, such as deposition power (col. 3, lines 60-62). Actor '455 further states that a type of power measured would be number of kilowatt hours of use (col. 7, lines 46-50). These measures would

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reduce the variability in sputtered film thickness in substrates by automatically compensating for erosion of the target (col. 3, lines 23-27).

It would have been obvious to one of ordinary skill in the art to incorporate the sputtering parameters taught in Actor '455 as the method of use for Turner '783 in order to gain the advantages of reduction of variability in sputtered film thickness in substrates by automatically compensating for the erosion of the target.

With respect to claim 8, Turner '783 further teaches that "when the usage (i.e. KWH of tool power) of the cathode (i.e. target) exceeds a predetermined amount" (col. 3, lines 42-44), the computer issues a stop condition (i.e. alarm generation).

With respect to claim 9, Turner '783 further discloses that the "information is input to the computer" (i.e. recording the criteria) (abstract). Since the information for the target is inputted into the computer, by default the information must be organized and stored by some system (i.e. table, spreadsheet, etc). The criteria is then selected and retrieved "to trigger appropriate actions" (abstract). Modified Turner '783 also discloses that the system can comprise a plurality of sputtering sources (i.e. targets) regulated by a single computer (col. 3, line 68; col. 4, line 1).

With respect to claim 10, Turner '783 further discloses a "stop condition" (i.e. alarm) (col. 3, lines 43-44) that is generated. The stop condition is generated if the cathode usage (i.e. reported accumulating rate) exceeds a predetermined amount (i.e. minimum accumulating rate).

With respect to claim 12, Turner '783 discloses "a sputtering system utilizing a computer" (abstract). The "desired deposition rate information is input to a computer,

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which establishes and maintains the desired rate and controls" (abstract) for "aging and deterioration of the target" (abstract). The "end of the target life is determined by the computer from objective criteria [that] triggers appropriate actions" (abstract), such as when the reported accumulating rate is less than the minimum, an operator is alerted to examine or replace the target. Since the computer branches to a stop condition when the cathode (i.e. target) reaches a predetermined amount, the objective criteria must be stored in the computer (i.e. in a database). The criteria is displayed in figure 1 as a graph (i.e. mapping table).

However Turner '783 is limited by not specifically stating onto what the target is sputtering (i.e. substrate, semiconductor piece, etc.)

Actor '455 teaches a sputtering magnetron using physical vapor deposition for film deposition onto "substrates or wafers" (col. 7, line 41).

It would have been obvious to one of ordinary skill in the art to use a substrate or wafer for sputter deposition taught in Actor '455 as a typical sputtered workpiece in the sputter target control method of Turner '783.

6. Claims 4-6, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner (US Patent No. 4,166,783) and Actor et al (5,478,455) as applied to claim 1 and further in view of Besser et al (US Patent No 6,610,181).

With respect to claim 4, the references are cited as discussed for claim 1. However the references are limited in that they do not select criteria based on thinnest wafers.

Besser '181 teaches a method of controlling the formation of metal layers onto a wafer via physical vapor deposition (col. 8, lines 25-27). Besser '181 further teaches a method that encompasses selecting allowable limits on wafer thickness. Selecting allowable limits would encompass having the control data be within the specifications (i.e. minimum accumulating rate) (col. 6, lines 20-28), thereby reducing waste materials and eliminating an "extremely difficult" step of having the wafer reenter a process chamber for recoating of a metallic layer (col. 2, lines 19-27).

It would have been obvious to one of ordinary skill in the art to use the method of selecting allowable limits for wafer thickness taught in Besser '181 as the method for selection in modified Turner '783 in order to gain the advantages of reduction of waste materials and streamlining of the method.

With respect to claim 5, Turner '783 further discloses that the "information is input to the computer" (i.e. recording the criteria) (abstract). Since the information for the target is inputted into the computer, by default the information must be organized and stored by some system (i.e. table, spreadsheet, etc). The criteria is then selected and retrieved "to trigger appropriate actions" (abstract). Modified Turner '783 also discloses that the system can comprise a plurality of sputtering sources (i.e. targets) regulated by a single computer (col. 3, line 68; col. 4, line 1).

With respect to claim 6, Turner '783 further discloses a "stop condition" (i.e. alarm) (col. 3, lines 43-44) that is generated. The stop condition is generated if the cathode usage (i.e. reported accumulating rate) exceeds a predetermined amount (i.e. minimum accumulating rate).

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With respect to claim 11, Besser '181 further teaches selecting allowable limits which encompass having the control data be within the specifications (i.e. minimum accumulating rate) (col. 6, lines 20-28), thereby reducing waste materials and eliminating an "extremely difficult" step of having the wafer reenter a process chamber for recoating of a metallic layer (col. 2, lines 19-27).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent No. 6,416,635; US Patent No. 6,610,181 relate to the state of the art.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Band whose telephone number is (571) 272-9815. The examiner can normally be reached on Mon-Fri, 8am-4pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

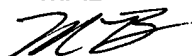
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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MAB



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SUPERVISORY PATENT EXAMINER